Module X

Investigation and Notifications

OBJECTIVES

1. Understand the requirements of DOE 5480.19 regarding investigations and notifications at DOE facilities and associated impact on safety and efficiency of operations.
2. Referring to actual copies of facility Occurrence Reports, discuss how a lack of proper conduct of operations led to improper operational results. (1.e)
3. Discuss proper critique principles and describe a proper critique process, including key elements. (1.h)
4. Define root cause and explain its importance to operational safety. (1.i)
5. Define and describe what lessons learned are and explain their importance to operational safety. (1.j)
6. State the purpose of ORPS and the process. (1.m)
7. Describe the key elements that determine the safety significance of a condition. (1.n)
8. Explain the role of lessons learned to operations, and sources for identifying lessons learned and industry experience. (2.m)
9. Refer to a copy of DOE 5480.19 and locate applicable guidelines and requirements for specific activities (1.a)

DOE 5480.19, Attachment I, Chapters 6 and 7 have been combined to make up the Investigation and Notifications section.

I. Chapter Summaries

A. Chapter 6: Investigation of Abnormal Events

This chapter covers important aspects of the abnormal event investigation program. Abnormal events do occur and when they do, they often cause an impact on the safe and efficient operation of the affected facilities. Therefore a program for the investigation of abnormal events should ensure that facility events are thoroughly investigated to assess the impact of the event, to determine the root cause of the event, to ascertain whether the

event is reportable to DOE (per DOE 232.1) and to identify corrective actions to prevent recurrence of the event. As future events are prevented through successful implementation of this program, the safe and efficient operation of the facility is improved.

B. Chapter 7: Notifications

This chapter provides guidelines to ensure uniformity, efficiency, and thoroughness of notifications that support fulfillment of DOE requirements consistent with DOE O 232.1. Proper notifications of abnormal or unusual events contributes to safe and efficient operation of the facility in a couple of ways. The first is that the notification results in the involvement of a larger pool of people whose knowledge can help stabilize and resolve the immediate situation at hand. The second is that being trained to follow a rigorous notification process ensures that vital information, needed to analyze and prevent future recurrence, is not overlooked.

II. Chapters and Guidelines Review

A. **Investigation of Abnormal Events:** Ensures that a facility's abnormal events are thoroughly investigated, and that the impact is assessed, the appropriate notifications are made, the root cause identified, and the corrective actions identified to prevent recurrence.

(The following explanations provide a summary for each of the guidelines. Refer to Attachment 1 of DOE 5480.19 if more detail is need for a specific guideline.)

1. **Events Requiring Investigation:** Events that occur in the facility and adversely affect operations, personnel safety, or DOE requirements receive thorough investigation. Examples of situations requiring investigation include:

- Design limit violation;
- Loss of special nuclear material;
- Procedural violation or personnel error that causes or could cause serious personnel injury/equipment damage;
- Equipment failure that could affect facility capability/safety;
- Radiological or toxic material limits are exceeded; etc.

Near miss situations also receive a formal review. A near miss situation is defined as a situation in which an inappropriate action occurs (or necessary action is omitted), but is detected and corrected before an adverse effect occurs.

2. **Investigation Responsibility:** The Operations Supervisor is responsible for the performance, consistency, and thoroughness of event investigation. Some activities may be delegated such as: gathering records; conducting interviews; determining long-term corrective action; etc.

3. **Investigator Qualification:** Investigators are trained and competent in facility systems and operations applicable to the event. They must also be unbiased and trained and competent in investigation techniques. These qualifications are important to the credibility of the investigation.

4. **Information to be Gathered:** Sufficient data must be collected as soon as possible after an event to enable accurate reconstruction and analysis. Data to be collected as soon as possible includes: Initial facility conditions; statements of personnel involved in the event; and pertinent documentation (logs, computer printouts, etc.).

5. **Event Investigation:** Upon completion of data collection, a structured review of the event is performed, consisting of the following steps:

   - Event Reconstruction - use of a sequence of events recorder printout or the development of a chronological list of events to establish how the event occurred. Personnel involved in the event are included in this process.
   - Event Analysis and Evaluation - upon establishment of the facts of the event, analysis is conducted to determine the response of equipment and personnel. The analysis emphasizes: determination of proper system response, comparison of actual and expected response, and adequacy of procedures and factors affecting human performance.
   - Root Cause Determination - determination of those causal factors that, if corrected, would preclude recurrence of the event.

   Operational failures of all kinds (operator error, component failure, management system failure, procedural error, etc.) challenge the safety environment of a facility. Therefore, any reduction in the incident rate and/or the severity of off-normal events will result in an overall improvement of safety for both the workers and the public at large. Correctly identifying the root cause with corresponding corrective actions has the direct effect of achieving such a reduction.

   - Corrective Action Determination - determination of those procedure changes, training activities, design modifications, and changes to administrative controls which will prevent recurrence of the event.

- Critique Process - The purpose of a critique is to assemble all of the facts about an event or operation. It is not to assign blame or be used as a basis to administer disciplinary action against an involved employee. The principles and elements of a good critique process are summarized as follows:

  – Initial categorization and notification using DOE O 232.1 is made before or concurrently with the critique meeting. DOE O 232.1 requires this to be done within 2 hours of discovery of the event's happening. Critique meetings, with few exceptions, should be held as soon as the situation is stable.

  – A leader, who is trained in proper critique methods, is assigned. It may be necessary to assign a leader who was not involved in the event to prevent prejudice or inappropriate influence of the outcome.

  – Before a critique convenes, the leader determines if personal statements are necessary. If so, statements will be obtained. The statements, are preferably prepared before the critique meeting starts and before personnel can discuss the event (collaboration can greatly reduce the value of statements).

  – Both off-normal events and successes are critiqued. The critique of off-normal events provides the basis for understanding why something went wrong and how to prevent its recurrence. The critique of successes is important because we want to be able to repeat the success and we may find ways of improving upon the success at the same time.

  – Formal critique minutes are prepared and serve as the record of what happened for simple events, and the foundation for any subsequent investigation, if warranted, for more complex events. Critique minutes facilitate the assignment of corrective action

responsibility and provide the basis from which root cause and recurrence control can be determined. Completed personal statements are attached to the meeting minutes.

- Safety Significance - The Limiting Conditions for Operation (LCOs), required to be maintained to provide a "safe" facility environment, are defined in the facility Final Safety Analysis Report (FSAR). A condition having safety significance has some chance of challenging one or more of these LCOs. Also any condition, besides those addressed by the FSAR, that could adversely affect the health and safety of workers in the facility would have safety significance. Examples of conditions having safety significance are:
  - Degraded or failed Vital Safety System Equipment (ventilation, fire suppression/detection, criticality detection and alarm, emergency power, etc.)
  - Improperly stored or leaking hazardous materials
  - Poor housekeeping (fire hazard, tripping hazard, etc.)
  - Improperly trained personnel
  - Poorly written or maintained operational procedures
  - Failure to perform surveillance required by the FSAR in a competent and/or timely manner.

6. **Investigative Report:** The major elements of the report include:
   - Description of the event;
   - Discussion of the event's impact;
   - Statement of the root cause;
   - Lessons learned;
   - Proposed corrective action.

- Lessons learned: information derived from DOE and industry operating experience, which is used to improve operations and safety. Contributes to operational safety by preventing future similar events from occurring, improving techniques for performing operations such that a risk reduction occurs, and improving management control systems that affect safety.
  - Sources: Occurrence Reporting and Processing System (ORPS) database, the Weekly Operating Experience Summary from the DOE Office of Nuclear Safety, and Government-Industry Data Exchange Program on-line information retrieval.
- ORPS - centralized operational data base that contains all unclassified Occurrence Reports submitted by DOE facility managers per DOE O 232.1. A computer-based repository of operational data, which supplies information to all DOE elements and contractors for trend analysis, performance measurement, and lessons learned development.

7. **Event Training:** In-house events are included in the training program for operations personnel when appropriate.

8. **Event Trending:** Deficiencies such as operator errors or inadequate procedures are trended. A periodic summary report is prepared and distributed to appropriate managers.

9. **Sabotage:** If sabotage is discovered or suspected, an immediate investigation is conducted to accomplish the following:
   - Determine the condition of affected systems and ensure operability of all safety-related systems;
   - Decide if continued operation is justified or if the facility can be safely shutdown;
   - Minimize impact of sabotage and deter future sabotage.

B. **Notifications:** Ensures timely notification of appropriate DOE and other agency personnel is made to ensure facility responsiveness to the ensure responsiveness to the health and safety concerns of the public.

(The following explanations provide a summary for each of the guidelines. Refer to Attachment 1 of DOE 5480.19 if more detail is need for a specific guideline.)

1. **Notification Procedures:** Procedures include: specific responsibilities for notifications; identification of events and conditions requiring notifications and primary and alternate personnel to be notified; establishment of notifications time requirements consistent with the facility emergency plan; and defined recordkeeping requirements.

2. **Notification Responsibility:** The operations supervisor ensures that all appropriate personnel receive notification when required. The actual notification of specific individuals or agencies may be accomplished by other individuals.

3. **Names and Phone Numbers:** Names of primary and alternate contacts and phone numbers and page codes are readily available to the person assigned to make notifications.

4. **Documentation:** A formal record of all notifications is maintained.

5. **Communication Equipment:** Adequate communication equipment is maintained in the main control area.

References and Suggested Reading

DOE 5480.19
Chapter 6 Investigation of Abnormal Events
Chapter 7 Notifications

DOE O 231.2 Occurrence Reporting and Processing of Operations Information

DOE-STD-1045-93 Guide to Good Practices for Notifications and Identification of Abnormal Events

Rocky Flats Field Office General Technical Base Study Guide

Operating Experience Weekly Summaries

DOE-EM-STD-5505-96 Operations Assessments

Occurrence Report Exercise

Module X
Exercise

Please see the end of this module for solutions/explanations.

Occurrence 1

An Operations Manager and Facility Manager conducted a safety walkdown and noticed unlanded power leads for an air compressor. The unlanded leads (not connected and ends were not covered) were verified to have no voltage and were covered with electrical tape on the exposed ends.

Investigators learned that maintenance electricians performed continuity checks on the air compressor, which was not properly operating, five months earlier, using a single point lockout. During the maintenance, electricians found damaged starter contacts, motor windings, and fuses. Due to pending facility de-activation, managers decided to not repair the air compressor, effectively closing out the maintenance activity. Afterward, the lockout was removed, however, the exposed leads were never terminated.

Investigators also determined that operators performing tours of the maintenance area (three times per shift over the five month period), had never noticed the exposed leads. Investigators also found an upstream circuit breaker which was left open, but not tagged, when the air compressor was taken out of service.

1. How did poor conduct of operations contribute to the occurrence of this event?
2. What requirements were violated?
3. What is the root cause?

Occurrence 2

Before commencing operations, the central control room operator was conducting pre-operational checks and noticed there was no position indication for a motor-operated valve on the distributed control system faceplate, but the graphics system display showed the valve closed. The Electrical and Instrumentation mechanics were notified and conducted an examination of the valve. The mechanics discovered that electrical leads for the valve were lifted.

Investigation determined that two days earlier, engineering personnel conducted a diagnostic test on the valve. Upon completion of the test, the engineering personnel did not inform the electrical mechanic responsible for restoring the circuit that the test was complete. As a result, the system was not restored. The following day, operations personnel asked the shift electrical mechanic to sign off the lockout to signify that the work was complete. During the maintenance shift turnover, the electrical mechanic was not informed of the lifted leads. He assumed the leads were landed and signed off the lockout without verifying work completion.

1. How did poor conduct of operations contribute to the occurrence of this event?
2 . What requirements were violated?
3. What is the root cause?

Occurrence Report Exercise Solutions

Occurrence 1

1. How did poor conduct of operations contribute to the occurrence of this event?

   Poor work control led to removal of lockouts while the equipment was nonfunctional and electrical leads were not correctly terminated.

   Poor operator inspection tours permitted the unlanded leads to exist for an excessive period of time. Operators should make thorough inspections of equipment in their area of responsibility, being alert for abnormal equipment configurations and deficiencies.

   Poor lockout implementation contributed to the potential for personnel or equipment damage resulting from shutting the upstream circuit breaker.

2. What requirements were violated?

   Work Authorization and Documentation, 5480.19 Chapter VIII.C.6
   Operator Inspection Tours, 5480.19 Chapter II.C.3 [b]
   Lockouts and Tagouts, 5480.19 Chapter IX.C.1

3. What is the root cause?

   Poor work control is the root cause of this occurrence.

Occurrence 2

1. How did poor conduct of operations contribute to the occurrence of this event?

   Poor shift turnover contributed to the electrical mechanic's assumption that the leads were landed. Turnover should ensure on-coming personnel have an accurate picture of facility status. Turnover also provides a review of past and scheduled operations. A shift briefing enhances turnover and operator awareness of plant status and identifies needed action.

   Poor independent verification by the electrical mechanic when signing for work completion.

2. What requirements were violated?

Turnover Checklists, 5480.19 Chapter XII.C.1 [b.(9)]
Occasions Requiring Independent Verification, 5480.19 Chapter X.C.2.a

3. What is the root cause?

Poor shift turnover is the root cause of this occurrence.